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# BISMUTH

Element Symbol: **Bi**

Atomic Number: **83**

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There is some dispute regarding the origin of the element name, bismuth. It is a latinised German word. The first thought is that it is named because white appearance (Wissmut meaning white material). The second relates to the region where the element was mined – the German words muten (mining–claim) and Wiesen (a place with bismuth deposits in Ergenbirge) were combined into Wiesen-mutung (a mining-claim in Wiesen) and Latinised to bisemutum, finally becoming bismuth in English.

Even though Bismuth was officially discovered as a chemical element in 1753 by French scientist Claude Geoffrey, “bisemutum” was mentioned by the Swiss scientist Theophrastus Bombasus von Hohenheim, also known as Paracelsus, in the 1500s. Paracelsus was ahead of his time using alchemy in his ambition to cure disease. Manly Hall called him “the precursor of chemical pharmacology and therapeutics and the most original medical thinker of the sixteenth century”. Some of Paracelsus’ achievements included the introduction of opium and mercury into medicines, identifying that the “miners’ disease” (silicosis) was the results of inhaling metal vapours, the connection of goiter with minerals in drinking water, and understood and expounded the importance of dosage size.

Bismuth crystals have an interesting hopper form and are rainbow coloured, from the oxide that quickly forms. Bismuth has a low melting point (271°C) but once melted, it can take practice to get the cooling time right to get the strange shaped crystals. Bismuth’s low melting point imparts the same property on alloys, which are extensively used for safety devices in fire detection and extinguishing systems.

Bismuth has strangely low toxicity for a heavy metal, making it suitable for use in pharmaceuticals. Bismuth subsalicylate is the active ingredient in formulations to treat temporary discomforts of the stomach and gastrointestinal tract, such as diarrhea, heatburn and nausea. It has anti-inflammatory activity in addition to its antacid properties. The only problem is that it gives some people a black tongue when it combines with trace amounts of sulfur in saliva for form bismuth sulfide. This side-effect is temporary and harmless. Other drugs that contain bismuth are used for treating eye infections, syphilis, peptic ulcers and as an internal deodorant (for those really smelly releases of gas!).

Some of the other uses of bismuth include:

- Semiconductors ( $\text{Bi}_2\text{Te}_3$ ) – used as diodes in mobile refrigerators and CPU coolers,
- Super conducting materials (Bismuth Strontium Calcium Copper Oxide) – discovered in 1988, these compounds are the highest temperature superconductors yet known,
- Targeted Alpha Therapy (Bi-213)
- Non-toxic replacement for lead in solders, paints, steel and brasses,
- Carrier for uranium fuel in nuclear reactors.

*Provided by the element sponsor sponsor Phil Andrews*

## ARTISTS DESCRIPTION

Bismuth, astonishingly, does not exist in its famous crystalline form on nature. It is created in the laboratory by clever chemists. The result is a most beautiful and peacock-coloured mini monument. How cool!

**KERRY LAMB**